

**Solar and Magnetic Disturbances.**

THE Kew photographic curves showed appreciable magnetic disturbances of a normal type on the evening of October 30 and early morning of October 31, but the first distinct precursor of the magnetic storm was an exceptionally sudden movement at about 6h. 3m. a.m. on October 31, shown alike in the declination, horizontal force and vertical force curves. This movement was largest in the horizontal force, where there was a sudden increase of about  $60 \gamma$  ( $1 \gamma \equiv 1 \times 10^{-5}$  C.G.S. unit). In the declination there was a simultaneous movement of about  $7'$  to the west, apparently preceded by a very tiny movement to the east, lasting too short a time to be distinctly shown. The first large movements commenced about 6.45 a.m., when there was a movement of the declination needle to the west through about  $34'$ , and a diminution of  $240 \gamma$  in the horizontal force. The storm was most violent between 10 a.m. and 7 p.m. on October 31, but there was a large amount of disturbance until 3 or 4 a.m. on November 1.

The traces from the Kew magnetographs—declination, horizontal force and vertical force alike—went off the sheet repeatedly, so that the full extent of the disturbance cannot be derived from them. A declination magnetograph, however, of lesser sensitiveness recorded apparently the complete movement, and showed a range of about  $2^\circ 12'$ . Between 1 and 7 p.m. there were at least twenty  $10$  to and fro oscillations of the declination needle—each occurring in but a few minutes of time—the amplitude of which exceeded  $20'$ . In addition to these there was a very large number of smaller oscillations. At times these followed one another so rapidly that they can hardly be seen apart on the photographic sheet. In the horizontal force there were also very numerous oscillations. The general tendency from 7 a.m. to 10.30 a.m. was towards a reduction of the force. From 10.30 a.m. to 1 p.m. the oscillations were about a value not far from the normal. At about 1 p.m. there commenced a rapid rise, which in twenty minutes amounted to about  $600 \gamma$ , the curve going off the sheet. During the next two and a half hours the trace was often off the sheet. Between 3.50 and 5.10 p.m. the trace crossed the sheet from edge to edge, representing a change of about  $750 \gamma$ , or somewhat more than one twenty-fifth of the value of the whole horizontal force. The vertical force disturbance was small at first, and did not become really large until nearly noon on October 31. From noon to 7 p.m. there were numerous large oscillations, the curve going off the sheet repeatedly on one side. At about 1.40 p.m. there was an oscillation where, in the course of five or six minutes, there was a decrease and increase of more than  $350 \gamma$ . The trace remained off the sheet from about 3.30 to 5 p.m. Between 5.10 and 5.50 p.m. the force diminished about  $450 \gamma$ .

The storm is much the most notable recorded at Kew since February 13-14, 1892.

CHARLES CHREE.

National Physical Laboratory, Richmond, Surrey,  
November 3.

In connection with the magnetic storm of Saturday last, October 31, it may be of interest to record that observations made between 10 and 11 a.m. on that day by Prof. Callendar and myself showed a violent distortion and reversal of the C line of hydrogen in the neighbourhood of the great sunspot group, which was then a little past the central meridian. A notable feature was the apparent detachment of a portion of the dark C line, the separated part presenting the appearance of a cloudy patch, displaced towards the violet by about three tenth-metres. The observations were unfortunately interrupted by clouds.

A reversal of the C line over the same spot had been observed on the two preceding days, but though on these occasions the bright line was more brilliant than on October 31 there was much less distortion of the dark line.

A. FOWLER.

Royal College of Science, South Kensington, November 3.

**Dr. Shaw's Address at the British Association.**

I HAVE received the following letter from Sir Arthur Mitchell, K.C.B., who has been for long closely identified with the Scottish Meteorological Society, both as a scien-

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tific worker and as an administrator, and who was one of the founders of the Ben Nevis Observatory, and I send it to you as it expresses what I am sure must have been the feeling of meteorologists on reading Dr. Shaw's otherwise admirable and inspiring address on methods of meteorological investigation.

34 Drummond Place,  
Edinburgh,  
October 15.

Dear Mr. Omund,—

Dr. Shaw's address to the subsection of astronomy and meteorology of the British Association in September last, by its appearance in NATURE of September 17 has quickly and effectively reached the whole scientific world, and it is misleading in important directions, quite unintentionally, I believe.

The absence of all reference to the meteorological work done by Buchan, Stevenson, Aitken, Buchanan, Murray, yourself and others will probably receive an interpretation which I hope is erroneous, for I cannot think that Dr. Shaw would designedly belittle the valuable work these men have done, which is recognised as being of a high character all over the world.

But it seems to me more remarkable that Dr. Shaw should have made no special reference to the work of the Ben Nevis Observatories. In that work a very great, costly and laborious effort has been made to advance meteorology and to add to knowledge, and this has been done mainly through private enterprise, under the guidance of the foremost scientific men of our time, including Kelvin, Tait, Buchan, Murray, Copeland, Aitken, Buchanan, Stevenson, and many others. The discussion of the outcome of this great experiment in connection with the physics of the atmosphere has only recently begun. It cannot be quickly finished, much time by many experts must be given to it, and it cannot fail to cost a large amount of money.

My special object in writing to you is to suggest that, as honorary secretary of the Ben Nevis directors, you should in some way supply what I regard as an incompleteness in Dr. Shaw's address by briefly stating how the work of the Ben Nevis Observatories now stands, and what prospects there are of its yielding further important additions to knowledge.

Very faithfully yours,

ARTHUR MITCHELL.

In accordance with Sir Arthur's suggestion I beg to make the following statement explanatory of the present position of the Ben Nevis Observatories, and to note briefly the work carried on at and in connection with these observatories.

When the observatory on Ben Nevis was opened twenty years ago very little was known about the condition of the atmosphere above a few hundred feet height over the British Islands. The first object aimed at was to determine the meteorological constants for that position, and the relations of the air there to that at sea-level in the neighbourhood. This latter part of the work has only been adequately carried out since the establishment of the Fort William Observatory in 1890. The observations down to the end of 1892 have been published in two volumes of the *Transactions of the Royal Society of Edinburgh* (Nos. 34 and 42). The first of these was printed at the expense of the Royal Society of Edinburgh, and the second at the joint cost of the Royal Societies of London and Edinburgh. Another volume is in the press, and will be issued shortly.

The constants referred to are:—(1) The average value at each hour of the day for each month of the year of barometric pressure, temperature of the air, humidity, rainfall, direction and force of wind, amount of cloud and sunshine on Ben Nevis. (2) The relation of each of these to the corresponding sea-level values at Fort William. Immediately arising from these average values is the question of the changes induced on them, especially on the second series, by different conditions of weather—that is, the determination of the vertical gradients of pressure, temperature, &c., under varying atmospheric conditions. This discussion has been partly carried out, and the more important results arrived at are summarised in papers appended to the two volumes of observations.

One of the most interesting practical aspects of the Ben Nevis records is their application to the reduction of barometric readings to sea-level, a subject which is at present engaging great attention in this country, in the United

States, and, indeed, wherever meteorology is studied. The other subjects treated in these papers include:—

(1) The changes in the hourly variation of the barometer in fine and in cloudy weather at Ben Nevis, Fort William, and several other stations.

(2) The general meteorological conditions on Ben Nevis in clear and in foggy weather.

(3) Atmospheric dust on Ben Nevis.

(4) The pumping effect on a barometer of strong winds.

(5) The difference in the direction of the wind at Ben Nevis from that at sea-level.

(6) The change of temperature with height in anti-cyclones.

(7) The diurnal ranges of the Ben Nevis and Fort William barometers when both are reduced to sea-level by the usual tables.

(8) The diurnal range of the variability of temperature from day to day at Ben Nevis and some other places.

(9) The meteorological conditions at Ben Nevis during the severe frost of January and February, 1895.

(10) The relation of wind direction to temperature and to rainfall at Ben Nevis.

The establishment of the Ben Nevis Observatories has provided meteorological data of a character unique in this country, and, indeed, in the world, owing to the position of Ben Nevis as a high-level station placed right in one of the storm-tracks of the Atlantic. But it has also led to investigations which could not otherwise have been carried out, for no increase in the amount or quality of low-level observations would have supplied the necessary data, and the high-level records got from kites or balloons are too fragmentary for the purpose.

The observatories were built with money subscribed by the public, and up to this time have been supported by subscriptions, aided by an annual payment of 100*l.* for the Ben Nevis Observatory and 250*l.* for the Fort William Observatory from the Parliamentary grant of 15,300*l.* given annually for meteorological purposes. What their future position may be depends on the recommendations of the Parliamentary Committee of Inquiry into the administration of this grant now sitting, but whether Parliament gives the money necessary to carry them on, or whether they are closed and abandoned, as they assuredly will be if not taken over by the State, the work done at and in connection with these observatories is a record of investigation which will be growingly studied by meteorologists.

Edinburgh, October 17.

R. T. OMOND

No one is more conscious of the shortcomings and omissions of the address than its author. One correction I should like to make here. The joint editors of the *Meteorologische Zeitschrift* are Dr. Hann and Dr. Hellmann; Dr. Perner is associated with the journal as "Herausgeber."

I cannot fail to be aware that, with perfect propriety, I might have devoted a large part, or even the whole, of the address to the obligations of meteorology to private enterprise in this country. In that case it would have been a different, perhaps a better, address, but I will ask your readers to believe that any omissions of that kind which they detect and regret were not due to a desire to belittle anything except the address itself.

In one sentence I did explicitly refer to Edinburgh and Ben Nevis. I cannot altogether emulate the achievement of Mr. Puff, who managed to extract so much meaning from a shake of Lord Burleigh's head, but I should like to say that if Sir Arthur Mitchell had used an appropriate magnifying power, and had got it properly focused upon that sentence, he would have read the following opinion which the mention of Ben Nevis always suggests to my mind, "that if means were found for endowing a chair of meteorology in the University of Edinburgh, and one of the distinguished Scottish meteorologists, whose names require no announcement from the chair to make them known to the British Association and far beyond, were appointed thereto, a most important and productive step would be taken towards the solution of the many problems connected with the great Scottish work of the Ben Nevis Observatories, the twenty-first annual report of which Dr. Buchan will present to the Association."

W. N. SHAW.

October 21.

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#### Weather Changes and the Appearance of Scum on Ponds.

If any of your readers could explain an interesting natural phenomenon constantly occurring here we should be very grateful. It is simply that, invariably before any decided change of weather, there comes up a scum on the surface of the pool or small lake which skirts our south and east lawns—part of the pleasure grounds surrounding the mansion. Sometimes it looks like soapy water, but at other times it is black, and makes the breasts of our swans as black as ink just above the water-line. Then the scum will suddenly disappear, and the swans' breasts become white again. Our geological formation is the junction of the Upper Greensand and the Lower Chalk. The bottom of our lake is chalk; it is fed by springs, and the stream formed by its overflow runs finally into the Thames. It is shallow, and is surrounded by large trees. There are at present eight swans on it, also many moorhens and wild duck, and quantities of fish, which attract herons; kingfishers live in the bank, which is very high on the far side. There is also an island with large trees and a dense under-growth.

PLATANUS ORIENTALIS.

Aston Rowant, Oxon.

With reference to the letter of "Platanus orientalis," it seems to me that a possible explanation of the appearance of dirty scum on the surface of the pond before any decided change of weather may be that a sudden change of barometric pressure may accelerate the flow of springs rising through the chalk of the floor of the pond. This would carry up to the surface of the water some of the fine mud which had rested on the chalk, or even lodged in crevices within it. When the flow of the springs diminished or ceased, the sediment would naturally subside once more. It would be interesting to keep an exact record of the appearance of the scum and of the variations of atmospheric temperature, pressure, and the rainfall by automatic recording instruments.

Without knowing the local conditions it would be impossible to speak definitely as to the sufficiency of this explanation.

Another that occurs to me is that, if the sediment at the bottom of the pond is of a flocculent character, its movements may be due to the same cause as those of the precipitate in a "storm-glass," whatever that cause may be; but in that case the appearance would probably be limited to dead calm weather.

It is possible that the scum may be organic, and it would be desirable to have it examined microscopically by a student of limno-plankton.

HUGH ROBERT MILL.

#### Cranial Casts.

In the number of NATURE which arrived here to-day there is a report of the interesting presidential address delivered by Prof. Symington in Section H at the British Association's recent meeting. In this report there are several statements which are likely to prove misleading to those who are not familiar with the literature relating to brain-casts. The reader might imagine (see p. 540) that this was an entirely new branch of research suggested by Dr. Forsyth Major's work on the subfossil Lemuroids (1898) and only fully exploited by Prof. Schwalbe in 1902. This, of course, cannot be the meaning which Prof. Symington intended to convey, because he is quite familiar with the scores of cranial casts made in such profusion by Prof. Gervais in the years 1867-1871, and by a long line of anatomists and palaeontologists both before and since that time, and with the valuable contributions to knowledge which have resulted from this fertile branch of study; in fact, Prof. Symington happened to visit the work-room in the Royal College of Surgeons in 1901 when I was examining and describing the considerable collection of such casts (representing more than one hundred genera) which have been brought together by the late Sir William Flower and the present conservator, Prof. C. Stewart. (And, with reference to Prof. Symington's remarks on curators, I may mention that no one more fully recognises the value of cranial casts than the present conservator of the Royal College of Surgeons' Museum.)